[Provisional Translation]

Outline of Space Domain Defense Guidelines

July 2025
Ministry of Defense

Background and Purpose of Formulating Space Domain Defense Guidelines

- **The use of outer space forms the foundation of people's lives. Services such as communications, observation, and PNT※1 form the basis of socio-economic activities and also play a significant role in times of disaster, making the use of outer space indispensable for the lives and peaceful livelihoods of Japanese nationals.**
- **Major countries are focusing on strengthening the capabilities and increasing the number of various satellites equipped with early warning, communications, PNT, and reconnaissance functions.**
  - China is rapidly enhancing PLA's C4ISR※2 capabilities by building satellite constellations for monitoring and tracking which support long-range precision strikes, and communications.
  - In Russia's invasion of Ukraine, the use of civilian commercial satellite images and communication satellite constellation had a significant impact on the war situation.
- **Some countries are stepping up the development of technologies to interfere with and neutralize the satellites of other countries to secure their own military superiority, leading to the development of space as a warfighting domain and increasing threats and risks in outer space.**
  - Technology development contributing to killer satellites, verification tests of RPO※3, etc., development and testing of DA-ASAT※4 missiles
- **As a global trend, international competition in space is further intensifying not only in the security field but also in science, technology, and commercial fields.**
  - Progress in the use of LEO※5 by the private sector due to the termination of ISS operations, promotion of exploration programs beyond the cis-lunar region such as Artemis program, and the emergence of new technologies such as AI※5 and optical communications.

MOD/SDF will swiftly strengthen our defense capabilities in the space domain, expand our capabilities in all domains including ground, maritime, and air, and aim to ensure the use of outer space under all circumstances.

Formulation of "Space Domain Defense Guidelines"

- **The guidelines clarify the necessity not only to protect satellites used by MOD/SDF for their missions but also to ensure the use of space by the government and the private sector, which forms the foundation of people's lives.**
- **The ASDF will be renewed as the "Air and Space Self-Defense Force (tentative name) " given that operations in the space domain are becoming equally important as ground, maritime, and air operations.**
- **The guidelines provide a direction for strengthening defense capabilities in the space domain and promote consistency of relevant MOD policies and consideration across the departments.**
- **The guidelines will realize a virtuous cycle of strengthening defense capabilities and economic power by supporting private companies' investment in related technologies.**

※1 PNT: Position, Navigation and Timing ※2 C4ISR: Command, Control, Communication, Computer, Intelligence, Surveillance and Reconnaissance
※3 RPO: Rendezvous and Proximity Operations ※4 DA-ASAT: Direct-Ascent Anti-SATellite ※5 LEO: Low Earth Orbit ※6 AI: Artificial Intelligence

Direction of Strengthening Defense Capabilities in Space Domain

To enhance SDF's capabilities in all domains by strengthening defense capabilities in the space domain

- ✓ Rapid and accurate **battlespace awareness** as well as early detection of indications of situations by real-time detection/tracking of targets from outer space
- ✓ Ensuring **SATCOM**※1 as the operational foundation by improving communications capabilities and resiliency
- ✓ **Mission assurance** by building capabilities for early detection of threats, identification of their intent/capabilities, and satellite protection, etc.
- ✓ Further reinforcing capabilities **to disrupt C4I**※2 **and other capabilities of opponent** as threats and risks in outer space expand

Battlespace Awareness

- Real-time detection/tracking of moving targets to ensure the effectiveness of stand-off defense capabilities
- Real-time HGV※3 detection/tracking in its glide phase
- Real-time monitoring of dynamic information and battlespace awareness in the vicinity of Japan

SATCOM

- Multi-layered and resilient SATCOM network ranging from stratosphere to LEO and GEO
- Accommodating increasing communication needs with a view on future operational concepts and contingencies
- Processing and analyzing collected information in an extremely short time and connection to the shooter

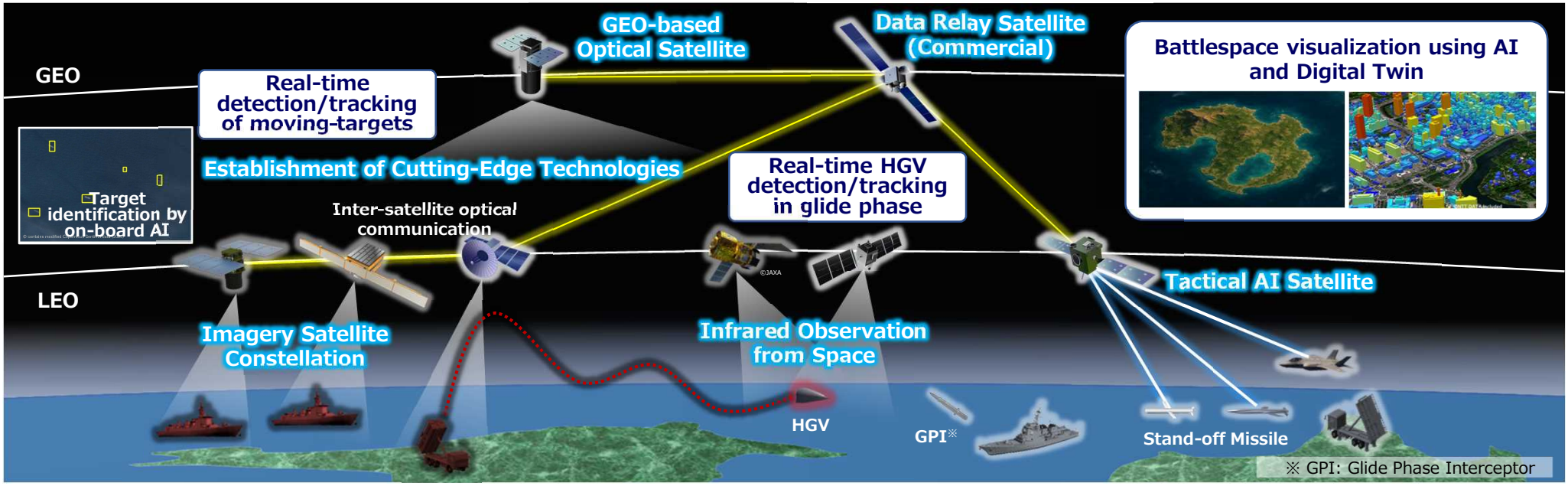
Mission Assurance

- Further strengthening SDA※4 capabilities, which are to understand the operations, utilizations, intentions, and capabilities of foreign satellites, and building capabilities necessary to protect satellites
- Strengthening resilience of the entire space system through bolstering cybersecurity, dispersing ground facilities, supporting multi-GNSS※5 satellite signals, etc.
- Establishing a system to responsively supplement lost functions of satellites used by MOD/SDF

In strengthening defense capabilities in the space domain, cooperation with our Ally and like-minded countries is indispensable in addition to further strengthening collaboration with other ministries and agencies, private companies, R&D organizations, etc. Japan will build a mutually complementary structure with our Ally and like-minded countries in terms of further strengthening capabilities and operational cooperation, while enhancing its autonomous defense capabilities in the space domain.

※1 SATCOM: Satellite Communications ※2 C4I: Command, Control, Communications, Computers and Intelligence
※3 HGV: Hypersonic Glide Vehicle ※4 SDA: Space Domain Awareness ※5 GNSS: Global Navigation Satellite System

Battlespace Awareness



Real-time detection/tracking of moving targets

- To establish a satellite constellation for the purpose of acquiring constant detection/tracking capabilities of target information from the perspective of ensuring the effectiveness of stand-off capabilities
- To establish cutting-edge technologies such as inter-satellite optical communication which enables secure and large-capacity communications as well as target identification by on-board AI
- To consider development of earth observation satellite at higher orbit, which enables more constant and extensive observation by GEO-based optical satellite, etc. in addition to observation from LEO using satellite constellation

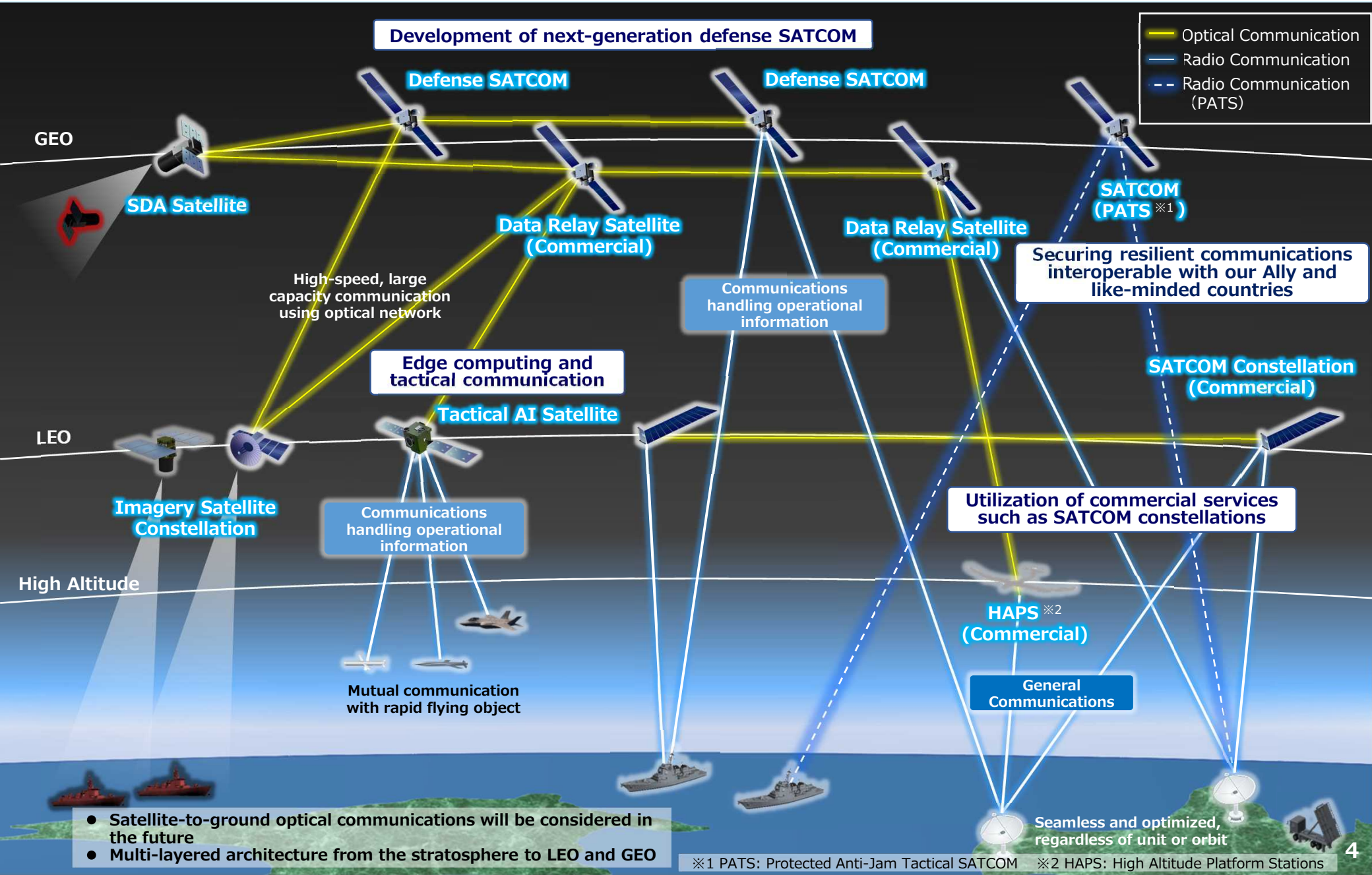
Real-time HGV detection/tracking in glide phase

- To demonstrate space observation of infrared sensors, to acquire earth background data, and to enhance domestic technologies for sensors including those other than infrared sensors, etc.
- To deepen Japan-U.S. cooperation, including collaboration with satellite constellation plan which is being developed in the United States

Battlespace visualization using AI and Digital Twin

- To develop an environment which enables immediate processing of vast amounts of data including those acquired by satellites using AI and provide commanders with user-friendly information using Digital Twin

SATCOM (1/2)



- Satellite-to-ground optical communications will be considered in the future
- Multi-layered architecture from the stratosphere to LEO and GEO

※1 PATS: Protected Anti-Jam Tactical SATCOM ※2 HAPS: High Altitude Platform Stations

SATCOM (2/2)

Development of Next Generation Defense SATCOM

- To promote the use of the Ka band, a high-frequency band which is resistant to jamming, and the installation of digital communications payloads for large-capacity and flexible communications in order to ensure interoperability with our Ally and like-minded countries, to strengthen resiliency against jamming, and to accommodate increasing communication needs
- To establish next-generation defense space communications technology through demonstration of optical communications and resilient communications technology, etc. in order to enhance the performance of mission equipment

Edge Computing and Tactical Communications

- To demonstrate tactical AI satellite in order to strengthen command and control capabilities which process and analyze a large amount of collected information in an extremely short amount of time on a satellite and connect to the shooter

Securing Resilient Communications Interoperable with Our Ally and Like-minded Countries

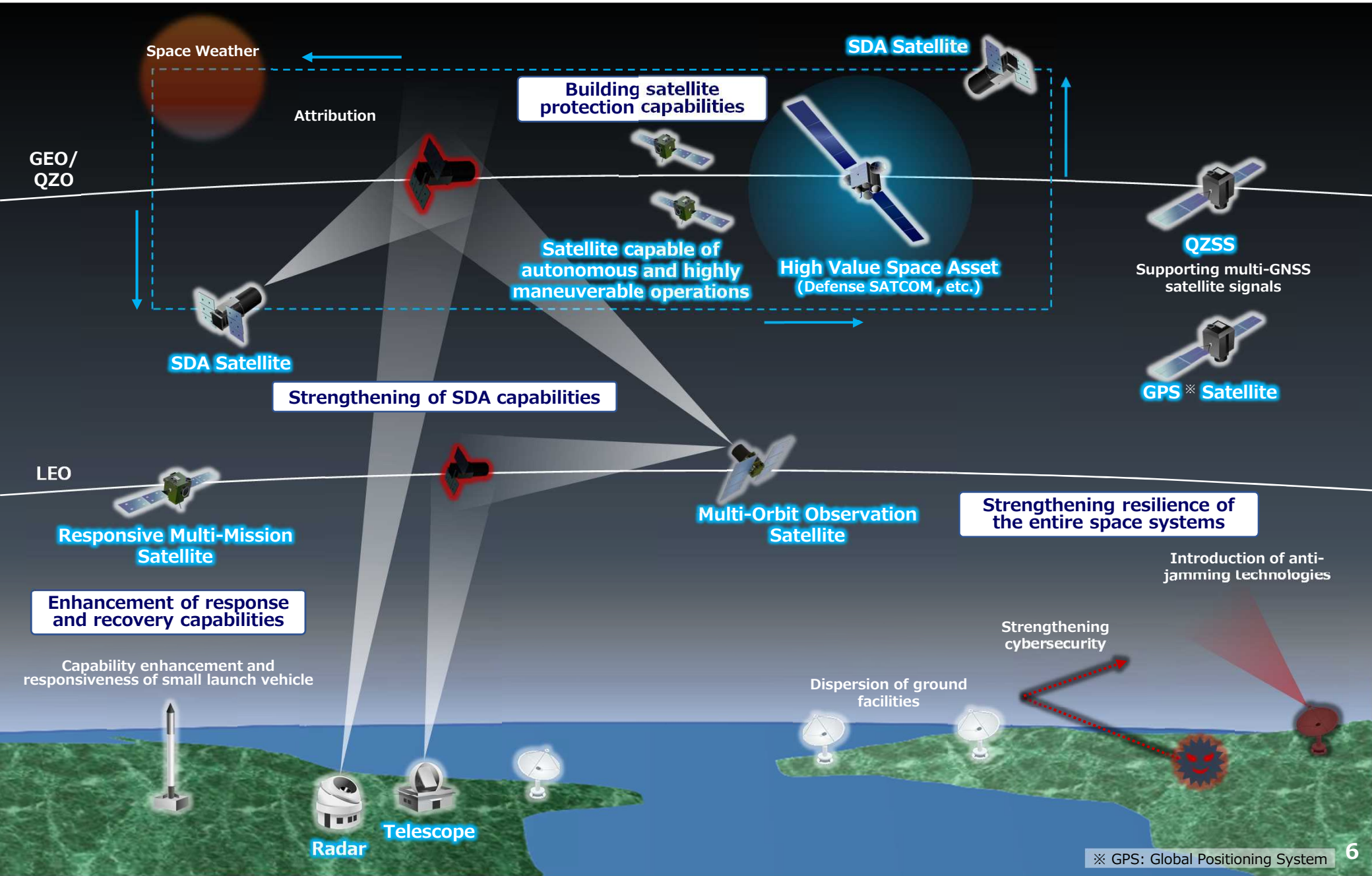
- To participate in PATS※, a framework led by the United States for resilient communications using shared SATCOM bandwidth

Utilization of Commercial Services such as SATCOM Constellations

- To utilize commercial SATCOM constellations in a flexible manner in order to secure large-capacity transmission for general communications
- To consider the utilization of commercial services using closed network and dedicated beams for communications handling operational information in order to accommodate the increasing communication needs
- To promote the demonstration of HAPS communication services in stratosphere and outer space as well as R&D of indigenous HAPS to ensure redundancy

※ PATS: Protected Anti-Jam Tactical SATCOM

Mission Assurance (1/2)



※ GPS: Global Positioning System

Mission Assurance (2/2)

Strengthening SDA Capabilities

- To further strengthen SDA capabilities in order to detect signs of threats to government and private satellites at an early stage and to understand their intention and capabilities
- To consider the operation of multiple SDA satellites, increase of the number of sensors, and the use of commercial services in addition to the operation of SSA※ radars and the launch of an SDA satellite
- To establish technology for building capabilities to detect the satellite maneuver on other orbits including LEO and GEO in order to enhance the accuracy of SDA

Building Satellite Protection Capabilities

- To deepen consideration on the protection of satellites through establishing technologies necessary for determining the cause of an abnormality, identifying the attacking entities, dealing with jamming against Japan's satellites on orbits, and operating satellites in an autonomous and highly maneuverable manner

Strengthening Resilience of the Entire Space Systems

- To strengthen cybersecurity for the entire space systems in order to prevent interception and falsification of SATCOM as well as data leak of information collected by various satellites
- To consider and promote specific measures such as dispersion of ground facilities in order to strengthen the resilience of ground-based space-related facilities
- To promote support for QZSS public signals on GNSS receivers, multi-GNSS deployment, and introduction of anti-jamming technology in order to respond to jamming against PNT signals

Enhancement of Response and Recovery Capabilities

- To establish a system to responsively supplement satellites even when the functions of satellites on orbits are lost due to DA-ASAT missiles, etc.
- To enhance the capabilities of small launch vehicle capable of responsive launch and to acquire responsive multi-mission satellite technology which can demonstrate capabilities by drastically shortening the on-orbit checkout period

※ SSA: Space Situational Awareness

Comprehensive Initiatives Underpinning the Policies

◆ **To strengthen comprehensive initiatives underpinning these policies in addition to strengthening defense capabilities through the procurement of various equipment and technology demonstration, etc.**

Creating a Virtuous Cycle of Defense Capabilities and Economic Power

- ◆ To expedite the process from R&D to demonstration, production, and application by actively introducing and utilizing cutting-edge technologies and services in the commercial field both in Japan and overseas
- ◆ To enhance the predictability of initiatives, to promote investment in technology development including dual-use technologies, and to develop/strengthen domestic space industrial base by maintaining close communication with private companies and R&D organizations and by further promoting public relations and presentation of needs
- ◆ To reflect the needs of MOD/SDF in policy documents such as Space Technology Strategy and to strengthen collaboration between R&D support programs and security initiatives

Strengthening Systems for the Promotion of Space-Related Policies

- ◆ To strengthen/streamline the structure for promoting space-related policies in a unified manner, in preparation for the establishment of “Air and Space Self-Defense Force (tentative name) ”

Strengthening Foundation for Personnel Related to Space Domain

- ◆ To build career paths after identifying necessary skills and qualities in order to develop internal human resources who are familiar with the space domain, in addition to the recruitment of external human resources
- ◆ To foster understanding and to raise the level of knowledge on the space domain through training by experts and participation in space programs hosted by U.S. Government

Strengthening Cooperation with Our Ally and Like-Minded Countries in Space Domain

- ◆ To further strengthen cooperation with our Ally, the United States, through collaboration on future LEO detection/tracking constellation for HGV and participation in PATS while continuing to enhance information sharing and cooperative system on SDA, etc.
- ◆ To further deepen cooperation to facilitate Japan-U.S. bilateral cross-domain operations and initiatives to enhance interoperability based on the establishment of the new U.S. Space Forces – Japan
- ◆ To be actively involved in international initiatives to ensure the use of space while further strengthening relationship with our Ally and like-minded countries in the space field by continuously participating in multilateral frameworks such as Schriever Wargame and CSpO※ Initiative

※ CSpO: Combined Space Operations

Timeline for Major Initiatives

Fiscal Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Strengthening MOD/SDF Structure			The establishment of "Air and Space Self-Defense Force (tentative name) " by FY2027								
		Strengthening systems for the promotion of space-related policies									
Battlespace Awareness											
Real-time detection/tracking of moving targets	Establishment/Operation of satellite constellation										
	Advanced demonstration of common key technologies										
	Consideration of the development of earth observation satellite at higher orbit, which enables constant and extensive observation of GEO-based satellite, etc.										
Real-time HGV detection/tracking in glide phase	Demonstration of space technology concerning HGV detection, etc. using HTV-X										
Battlespace visualization using AI and Digital Twin	Trial production and demonstration of real-time Digital Twin										
SATCOM											
Development of next generation defense SATCOM	Development of next generation defense SATCOM						Operation of next generation defense SATCOM				
	Development/demonstration next generation defense technology demonstration satellite										
Edge computing and tactical communications	Development/demonstration of tactical AI satellite										
Securing resilient communications interoperable with our Ally and like-minded countries	Preparation for demonstration/communications demonstration of PATS										
	Participation in PATS										
Utilization of commercial services such as SATCOM constellations	Demonstration/introduction of commercial SATCOM constellation										
	Technology demonstration necessary for indigenous HAPS										
Mission Assurance											
Strengthening SDA capabilities	Operation of SSA radar										
	Development of SDA satellite	Operation of SDA satellite									
	Development/demonstration of multi-orbit observation demonstration satellite										
Building satellite protection capabilities	Development/demonstration of RPO satellite in GEO										
	Research concerning monitoring/protection technologies										
Strengthening resilience of the entire space systems	Strengthening cybersecurity, etc.										
Enhancement of response/recovery capabilities	Development/demonstration of responsive multi-mission satellite										
	Strengthening capability of responsive small launch vehicle										

※ The results of development and demonstration projects will be considered for equipping